IN THE CLAIMS

Please amend Claim 1 as indicated.

CLAIMS

1. (Currently Amended) A method of rendering a multi-dimensional digital image ~~using raytracing in a multi-dimensional space~~ by initializing variables of a multi-dimensional digital differential analyzer (DDA), said method comprising the ~~step~~ steps of:

setting up variables of ~~a~~ said multi-dimensional digital differential analyzer (DDA) using multiplications only, wherein for each axis of ~~said~~ a multi-dimensional space~~,~~;

setting a numerator that holds the progress within a cell along that axis; ~~and~~

setting a denominator that describes a size condition causing said DDA to step to a next cell; and

rendering the digital image based upon the initialized variables of the multi-dimensional digital differential analyser (DDA).

2. (Original) The method according to claim 1, wherein for a vector, a denominator of said vector for an axis is equal to:

a delta for a vector component, excluding the component of said axis, for two dimensions; and

a product of deltas for all vector components, excluding the component of said axis, for greater than two dimensions.

3. (Original) The method according to claim 2, wherein said multi-dimensional space is two dimensional (2D) space and said denominators are:

DenX = y-delta, and

DenY = x-delta.

4. (Original) The method according to claim 2, wherein said multi-dimensional space is three dimensional (3D) space and said denominators are:

DenX = y-delta * z-delta,

DenY = x-delta * z-delta, and

DenZ = x-delta * y-delta.

5. (Original) The method according to claim 2, wherein for a vector V, a numerator of the vector V for an axis Q may be initially equal to:

(1-Fract(B·Q))*DenQ, if the vector V is positive along the Q axis; and

Fract(B·Q)*DenQ, otherwise.

6. (Original) The method according to claim 5, further comprising the step of tracing said vector dependent upon said initial values of said numerators and denominators for all axes of said vector.

7. (Original) The method according to claim 6, wherein said tracing step comprises, until said vector is traced, repeatedly applying the steps of:

determining an axis having a numerator that is smallest for all axes;

for all axes other than the determined axis, calculating a new numerator value for each of said axes equal to a current value of said numerator minus the numerator of said determined axis;

setting the numerator of said determined axis equal to the denominator of said determined axis; and

stepping into a cell adjacent to said cell on said determined axis, in the direction of the dot product of said vector and said determined axis.

8. (Original) An apparatus for rendering a multi-dimensional digital image using raytracing in a multi-dimensional space, said apparatus comprising:

a multi-dimensional digital differential analyzer (DDA); and

means for setting up variables of said multi-dimensional digital differential analyzer (DDA) using multiplications only, wherein for each axis of said multi-dimensional space, a numerator holds the progress within a cell along that axis and a denominator describes a size condition causing said DDA to step to a next cell.

9. (Original) The apparatus according to claim 8, wherein for a vector, a denominator of said vector for an axis is equal to:

a delta for a vector component, excluding the component of said axis, for two dimensions; and

a product of deltas for all vector components, excluding the component of said axis, for greater than two dimensions.

10. (Original) The apparatus according to claim 9, wherein said multi-dimensional space is two dimensional (2D) space and said denominators are:

DenX = y-delta, and

DenY = x-delta.

11. (Original) The apparatus according to claim 9, wherein said multi-dimensional space is three dimensional (3D) space and said denominators are:

DenX = y-delta * z-delta,

DenY = x-delta * z-delta, and

DenZ = x-delta * y-delta.

12. (Original) The apparatus according to claim 9, further including means for, for a vectorV, initializing a numerator of said vector V for an axis Q equal to:

(1-Fract(B·Q))*DenQ, if the vector V is positive along the Q axis; and

Fract(B·Q)*DenQ, otherwise.

13. (Original) The apparatus according to claim 12, further comprising means for tracing said vector dependent upon said initial values of said numerators and denominators for all axes of said vector.

14. (Original) The apparatus according to claim 13, wherein said tracing means comprises:

means for determining an axis having a numerator that is smallest for all axes;

means for, for all axes other than the determined axis, calculating a new numerator value for each of said axes equal to a current value of said numerator minus the numerator of said determined axis;

means for setting the numerator of said determined axis equal to the denominator of said determined axis; and

means for stepping into a cell adjacent to said cell on said determined axis, in the direction of the dot product of said vector and said determined axis;

wherein the foregoing means are repeatedly applied until said vector is traced.

15. (Original) A computer program product having a computer readable medium having a computer program recorded thereon for rendering a multi-dimensional digital image using raytracing in a multi-dimensional space, said computer program product comprising:

computer program code means for setting up variables of a multi-dimensional digital differential analyzer (DDA) using multiplications only, wherein for each axis of said multi-dimensional space, a numerator holds the progress within a cell along that axis and a denominator describes a size condition causing said DDA to step to a next cell.

16. (Original) The computer program product according to claim 15, wherein for a vector, a denominator of said vector for an axis is equal to:

a delta for a vector component, excluding the component of said axis, for two dimensions; and

a product of deltas for all vector components, excluding the component of said axis, for greater than two dimensions.

17. (Original) The computer program product according to claim 16, wherein said multi-dimensional space is two dimensional (2D) space and said denominators are:

DenX = y-delta, and

DenY = x-delta.

18. (Original) The computer program product according to claim 16, wherein said multi-dimensional space is three dimensional (3D) space and said denominators are:

DenX = y-delta * z-delta,

DenY = x-delta * z-delta, and

DenZ = x-delta * y-delta.

19. (Original) The computer program product according to claim 16, further including computer program code means for, for a vectorV, initializing a numerator of said vector V for an axis Q equal to:

(1-Fract(B·Q))*DenQ, if the vector V is positive along the Q axis; and

Fract(B·Q)*DenQ, otherwise.

20. (Original) The computer program product according to claim 19, further comprising computer program code means for tracing said vector dependent upon said initial values of said numerators and denominators for all axes of said vector.

21. (Original) The computer program product according to claim 20, wherein said computer program code means for tracing comprises:

computer program code means for determining an axis having a numerator that is smallest for all axes;

computer program code means for, for all axes other than the determined axis, calculating a new numerator value for each of said axes equal to a current value of said numerator minus the numerator of said determined axis;

computer program code means for setting the numerator of said determined axis equal to the denominator of said determined axis; and

computer program code means for stepping into a cell adjacent to said cell on said determined axis, in the direction of the dot product of said vector and said determined axis;

wherein the foregoing means are repeatedly applied until said vector is traced.